really belong to a variety of the living Fallow Deer. And I thank its author, Sir Victor Brooke, for having brought forward evidence on the point which is not presented by any of the large series of recent antlers known to me in the British and Continental Museums, and without which I could not venture to identify the fossil with the living form. He has supplied the missing link hitherto sought in vain, and thereby removed two synonyms from the bulky catalogue of fossil mammalia. This identification, however, as I have already remarked in NATURE (vol. xi., pp. 113, 114), has little, if anything, to do with the further question, raised by Drs. Jeitteles and Sclater, as to whether the Fallow Deer now living in Northern and Central Europe was introduced—like the horse into South America—by the hand of man; and on this point I am glad to find my views shared by so high an authority on the Cervidæ as Sir Victor Brooke.

W. BOYD DAWKINS

Owens College, Jan. 16

The Habits of the Belted Kingfisher (*Ceryle alcyon*)

IN NATURE, vol. vii. p. 362, I made the assertion that I had "never seen a kingfisher take its food otherwise than by swallowing it whole, while yet upon the wing," and therefore questioned the truth of the remark made by Mr. Darwin, that kingfishers, having caught a fish, "always beat it until it is killed." The truth of my assertion was doubted by many, and being assured by careful observers that Mr. Darwin's remark did apply to our species, I determined to very carefully study the habits of the bird in question, and have taken every opportunity possible, during the past two years, to familiarise myself with the daily routine of its life. The following is the result:—In 1873 my opportunities were exceptionally good for observing the movements of a pair of these birds, inasmuch as the whole season through—from April to November—was spent upon the water, studying our freshwater fishes. My daily record of observations mentions my watching the kingfisher *while feeding*, from one to four times a day for eighty-three days—an average of twice a day, or 166 dives for fishes, witnessed; and either every plunge was unsuccessful, or the bird swallowed, before alighting, every fish he had taken. It is to be presumed, of course, that occasionally the bird missed his prey. At the close of the season, therefore, I felt satisfied that I was correct in my assertions; but, as one of our best ornithologists has said, "the horizon of one man is at the best very limited, and many ornithological facts occur that are not dreamed of in his philosophy;" and so, on mentioning the results of my seven months of observation to a careful observer of our birds, and finding that he sided with Mr. Darwin, I determined to repeat my observations, and have done so through the spring, summer, and early autumn of the present year. My opportunities were equally good, and, very much to my own satisfaction, I have a different result to give. It is proper to state here, that during the summer of 1873 my observations were made altogether in one locality, upon one stream—the summit level of a canal—and confined to one pair of birds. During the present year I watched the kingfishers in several widely differing localities. My note-books make mention of this bird from two to six times in a day, for 101 days—about 400 observations; and of this series, eighty-eight instances are recorded of seeing the kingfisher capture, and, on alighting, deliberately beating the fish against the limb on which he stood, and then swallowing the *butchered* fish. This is a long way from being a constant habit of the kingfisher; less than one-fourth of the fish taken being killed previously to being swallowed. There is, of course, some cause for both habits occurring, and I believe it is to be explained in this way:—

As already stated, my observations during 1873 were confined to one pair of kingfishers, and to the one locality they frequented—the summit level of the Delaware and Raritan Canal—and the obvious reason of the kingfishers always swallowing their prey as soon as caught was simply that they fed exclusively on the smaller cyprinoids frequenting that sheet of water. I know, of my own fishing experience (pursued after a different manner from the kingfishers, however), that millions of cyprinoids are found there, as though they sought there an asylum from the attacks of predatory fishes.

During the season just past, I took notes on such kingfishers as were seen about two creeks, a mill-pond, and the Delaware River. In each of these localities large fishes of many kinds are more or less abundant, and the percentage of small cyprinoids—from two-and-a-half to three inches long—being much less than in the canal, it would evidently be irksome to so voracious a bird as the kingfisher to wait until some fish, the proper size for swallowing without preliminary butchering, should come within reach.

It therefore seems to depend largely upon the size of the captured fish, whether or not it is killed by the kingfisher before being swallowed.

On examination of my note-books I find also that when the parent birds had young in the nest, or while the hen-bird was upon her eggs, the male bird was most frequently seen to carry a fish in his beak to some convenient perch, and there kill and divide it. This appeared to be the manner of proceeding when the parent bird purposed feeding its mate or the young; being able, I judge, to disgorge a fragment of a larger fish, but not to eject an entire fish.

Both habits having been found to be true of this bird—that of swallowing the fish when caught, and of killing it before eating it—it is desirable to know why the latter method should be the rule, almost without exception, in some localities. I can only suggest that this may depend upon the anatomical characteristics of the fishes caught by the kingfishers. When an abundance of cyprinoids—soft-finned fishes—are to be obtained, then little or no preliminary carving on the part of the birds is necessary; but if young acanthopterygians, and tough, hard-scaled fishes of any family, have to be depended upon, then the kingfisher will be careful to first kill and pull in pieces such fishes, that unsuitable portions may be rejected. I have a memorandum of one instance where a young gizzard shad (*Dorosoma cepedianum*) was beheaded and divided into four portions before the kingfisher ate it.

In studying the habits of our American birds—and I suppose it is true of birds everywhere—it must at all times be remembered that there is less stability in the habits of birds than is supposed; and no account of the habits of any one species will exactly detail the various features of its habits as they really are, in every portion of the territory it inhabits.

Trenton, New Jersey, Nov. 20

CHAS. C. ABBOTT

Kirke's Physiology

IN Kirke's "Physiology" (p. 128, 7th edition) mention is made of a conception, due to Mr. Savory, concerning a probable function of the Sinuses of Valsalva, which appears to me to be based on a neglect of an important hydrostatical law. And as this error is not only widely spread, but is considered a point of some importance among students of physiology, it may not perhaps be unwise, even now, to call attention to it. It is stated that, owing to the expansion of the aorta towards its termination, part of the force of the reflux of the column of blood is sustained during diastole by the muscular substance of the ventricle. Now, it seems that a consideration of the law above referred to, which is known as Pascal's "Principle of the Equality of Pressures," must essentially modify this statement. It will be well to note, however, before tracing its application, that notwithstanding the varying mechanical conditions of the column, and the structures in relation with it, these conditions at any one point of time during dilatation may be regarded as fixed and invariable. Also, that as these conditions vary in degree and not in kind, what is true of any one period of time must, in so far as the present demonstration is concerned, be true of any other.

Let us consider the state of things immediately upon the conclusion of the systole. Firstly, the whole arterial system is in a state of distension, and, in virtue of its elasticity, tends to contract and to impel the blood in two directions—onwards through the capillaries, and backwards against the heart. There is also a cessation of the opposing impulsive force from the ventricle, and the combined effect of these two actions is to produce the "force of reflux." And since, as has been shown above, it is unnecessary to trace the variations due to the mobility of the system through the whole period of dilatation, it may be said that at any given instant we have the following data, viz., a column of fluid contained in a vessel with an expanded base, and a certain force impressed upon that column. It is obvious that it cannot affect our conclusions to assume that the force of reflux is transmitted to an imaginary surface, which we can fix at a point immediately above the expansion of the vessel, where it attains its normal calibre, and we can then ascertain how this force is further transmitted to the base. This base is, however, made up of two parts, a circumferential part by the muscular substance of the ventricle, and a central part by the semilunar

valves, the whole area being greater than that of any other section of the column. Now, the question at issue is, whether by this arrangement the semilunar valves bear any less pressure because a portion of the base of the column rests upon the wall of the ventricle. That they do not may be sufficiently proved by the following considerations.

It is a generalisation from Pascal's law that "when a liquid enclosed in a vessel is submitted to an external pressure, every plane surface that we can imagine in the interior of the vessel experiences a pressure proportional to its area." As a consequence of this law, it follows, if the force impressed upon our imaginary surface represent the total force of reflux, that the pressure sustained by the whole area of the base will be considerably greater than the actual force of the column, and this increase of pressure will be proportional to the difference between the areas of the two surfaces. Also, the pressure upon the semilunar valves will be entirely independent of the pressure upon the rest of the base, and will be directly proportional to their own extent. It may be concluded, therefore, that whatever the condition of things at the base of the aorta may be, no mechanical advantage is gained thereby; indeed, if the area of the valves be equal to that of the surface we have taken, they will sustain a pressure equal to the total force of reflux of the column. Hence, by extending the area of the base over the wall of the ventricle, the only effect is to increase the total amount of pressure sustained, without at all lessening the pressure upon its original extent.

It is true that if the aortic orifice contract with the muscular substance of the ventricle, that in this way, *i.e.* by decreasing the area of the valves, a varying amount of advantage would be gained which would be greatest at the time of greatest contraction. This condition is, however, the only one that can at all favour the idea that "the reflux is most efficiently sustained by the muscular substance of the ventricle," and as this condition is doubtful, it must still seem that the main feature of Mr. Savory's theory cannot be supported. W. PERCY ASHE

Phœnician Characters in Sumatra

IN a short communication to the Anthropological Institute in December last (NATURE, vol. xi. p. 199), Phœnician characters were stated by me to be still in use in South Sumatra. As many of your readers may be glad to have more information on the subject, I write to say that the district above alluded to includes Rejang, Lemba, and Passammah, between the second and fifth parallels of south latitude. Several manuscripts, on bamboo, from this region are preserved in the library of the India Office; and a Rejang alphabet is given by Marsden in his "History of Sumatra," third edition. Some of his characters, however, appear to have been incorrectly copied. About half the Rejang letters are admitted by all the Oriental scholars to whom I have shown them to be Phœnician of the common type; others being similar to forms found in Spain and other Phœnician colonies. Most of the letters are *reversed*, a peculiarity which is explained by the fact that the Rejang writing, according to Marsden, is read from left to right, contrary to the practice of the Malays generally. The matter is of great interest, and, it is to be hoped, will be investigated by Phœnician scholars.

J. PARK HARRISON

Ring Blackbird

IN my letter in NATURE, vol. xi. p. 187, I did not refer to the Ring Ousel, for it did not occur to me that anyone would suppose that, with the apparatus of so many standard works on birds, I could fail to identify my bird, if he were a Ring Ousel, male or female. I therefore add that my bird is in no respect (save the prevailing colour) like that species of *Turdus*. It is *exactly* like a female blackbird, save that it has a white ruff, in the position of the Barbary Dove's ring, and white spot under the chin. I have never seen a Ring Ousel, or the picture of one, with those characteristics. Besides, the Ring Ousel is migratory, and would hardly be seen till the spring.

Athenæum Club, Jan. 16 C. M. INGLEBY

[Considering the time of year at which this specimen was obtained, it is more probable that it is a pied variety of the blackbird (which is far from uncommon) than a Ring Ousel. If our correspondent will forward the specimen to us, for examination, we will settle the point for him, and return it.—ED.]

OUR ASTRONOMICAL COLUMN

THE TOTAL ECLIPSE OF THE SUN ON APRIL 6.—Dr. Janssen's station for the observation of this eclipse is mentioned as probably Hué, the position of which place, as laid down on the Admiralty Chart of Cochin China, is in longitude 107° 38′ east of Greenwich, and latitude 16° 29′ north. For this point the *Nautical Almanac* elements give the following figures :—

First contact at 1h. 38m. 6, local mean time, 130° from the sun's N. point towards the west, for direct image. Totality begins at 2h. 57m. 2s., and continues 3m. 12s., the sun at an altitude of 46°.

ENCKE'S COMET will no doubt be within reach as the moon withdraws from the early evening sky. The positions subjoined are reduced to 8h. Greenwich time from the ephemeris of Dr. von Asten, of Pulkova, published by the Academy of Sciences of St. Petersburg :—

	R.A.	N.P.D.	DISTANCE.
	h. m. s.	° ′	
1875—Jan. 24	23 23 31	85 40·6	1·989
,, 25	— 24 53	85 32·9	
,, 26	— 26 16	85 25·0	
,, 27	— 27 40	85 17·0	
,, 28	— 29 6	85 8·8	1·977
,, 29	— 30 33	85 0·4	
,, 30	— 32 2	84 51·9	
,, 31	— 33 31	84 43·3	
Feb. 1	— 35 2	84 34·5	1·961
,, 2	— 36 34	84 25·5	
,, 3	— 38 8	84 16·4	
,, 4	— 39 43	84 7·1	
,, 5	23 41 20	83 57·6	1·940

Mr. Otto Struve writes that Dr. von Asten's calculations show the last three revolutions of this comet can be perfectly represented by a uniform mean motion, without the hypothesis of a resisting medium, and even with greater precision than all the previous observed returns with that hypothesis. At the same time, during more than one revolution, something like acceleration has been indicated, and nearly to the same amount as Encke had supposed. This was the case between 1862 and 1865. Again, in other revolutions, as between 1845 and 1848, the acceleration has been subjected to very considerable changes. In the actual state of his researches Dr. von Asten is inclined to conclude that the existence of a resisting medium is not proved by the motion of Encke's comet, and that the observed acceleration in several returns ought to be attributed to the action of other forces; for instance, repulsive power produced by the approach of the comet to the sun, the effect of which might vary considerably, according to the conditions in which the return to perihelion takes place. A short paper by Dr. von Asten on this interesting subject is in the press.

WINNECKE'S COMET OF SHORT PERIOD, last visible in 1869, will also be observable in the morning sky from about the next new moon. The ephemeris calculated by Prof. Oppölzer of Vienna will be found in No. 2,016 of the *Astronomische Nachrichten*. This comet will probably be faint, while it remains visible at the present return. It arrives at perihelion on March 12, and at its least distance from the earth on February 15. It is Comet 1819 (3), and Oppölzer thinks he has identified it with one of the imperfectly observed comets in 1808. The elements which have been determined for 1875 show that the comet now makes a very close approach to the orbit of Jupiter; indeed, in heliocentric longitude 109° 25′, the distance between the two orbits is less than 0·06 of the earth's mean distance from the sun; this point is passed rather less than two years before perihelion passage. So far as can be judged at present, the comet will not be liable to great perturbation from the attraction of Jupiter till the year 1907, when it is possible a complete